

Daily Homogenization in Norway

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25.10.2016

Objectives

- Establish a quality assurance tools to identify and adjust for homogeneity breaks
- Producing homogenized daily values of temperature and precipitation for a number of long climate series.
- Facilitate homogenized daily values and analysis for homogenization so that it is available to external users, such as Statkraft.
- Develop methodology to generate "homogenized" daily values of precipitation and temperature for given locations / catchments based on gridded (1x1 km) map.

Methods

SPLIDHOM

HOMER & SPLIDHOM framework of COST Action ES0601 (*HOME*, 2011). **HOMER**



RHtests_dlyPrcp



RHtest_prec, (Wang & Feng) Climate Research Division, Atmospheric Science and Technology Directorate, Toronto, Ontario, Canada (published online 2009).

Multiple Analysis of Series for Homogenization Tamás Szentimrey



MASH, (Version MASHv3.03), Hungarian Meteorological Service by Szentimrey (1994, 1999, 2013).

Locations/Network Temperature / Precipitation



Network





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Results of the homogenization

Breaks



Network	Breaks
Temperature	
 7 stations @Tromsø 	1
7 @ Trondheim	7
 12 @ Bergen 	3
 10 @ Kristiansand 	3
• 10 @ Oslo	3
Precipitation	
 1 @ Bardufoss 	0 (1?)
 Mo i Rana 	0 (2?5?)
 Fokstua 	8 (2?)

- Fokstua
- Takle
- Sauda

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1

0

OSLO





Year

What happen in 1988?













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- - -

Mo i Rana







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Causes of breaks

What causes the breaks?

- Relocation (> 100 meters)
- New buildings near
- Changes in vegetation
- From Norwegian to Swedish precipitation gauge
- Recently Painted screen
- Geonor / PT100 Automation
- Inspections: Fixes / leveling, changes routines

Relocation







From manual to automatic WS



From manual to automatic WS



$MI-46 \rightarrow MI-74 \rightarrow MI-2001$



Norwegian to swedish precipitation gauge



New buildings



Vegetation grows



Lesson Learn

Won knowledge and experience with state-of-the-art algorithms for homogeneity testing (HOMER, MASH, SPLIDHOM, RHtest)

The algorithms are essentially suitable, but must be interpreted and compared carefully with metadata series.

Found that noise vs. signal in daily serials masquerades possible inhomogeneities due noisy (large variance), especially for precipitation.

Important to analyze annual, seasonal and monthly values.

Benefit to apply various algorithms, provide more robust detection of violations.

Homogenization of daily values are important if the tails of the frequency distribution and extreme values are important.

Analysis of limited series is pioneering work, there are not many studies to compare with.

Challenges with daily data

Current research needs daily data for studying:

- - Variability in weather?
- - Trends and climate variability?
- - Properties of extreme values?
- Trenberth et al. (2007):

"This [inhomogeneous data] frames, in particular, Understanding of extremes, because changes in Extremes are often more sensitive to inhomogeneous Climate surveillance practice than changes in the average".

Weather observer before and now...





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Thanks for your attention!

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